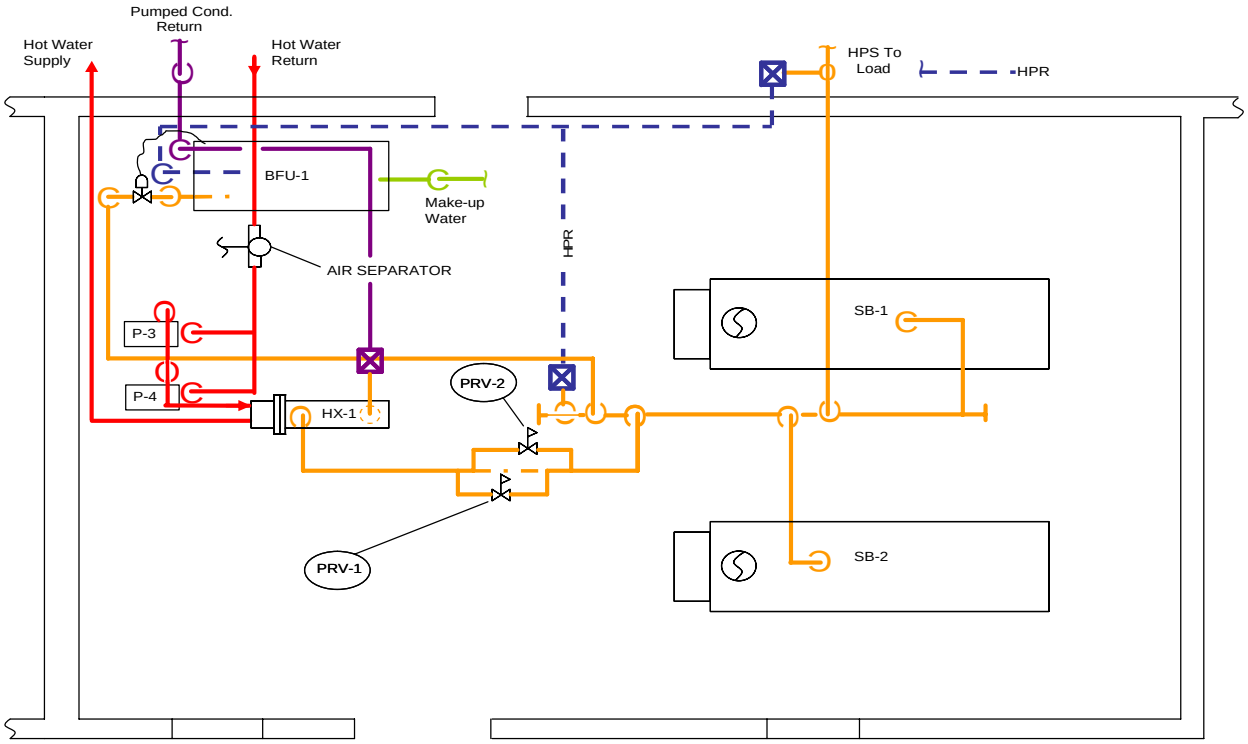
Final Public Report for ESA-063

Introduction:

The steam system serving the facilities at Dysersburg, TN consists of two steam generating units (SB-1 and SB-2) with a total output of 5.8 thousand pounds per hour (klb/hr) of steam. Steam is supplied at one header pressure which is distributed to the various plant loads. The general configuration of the plant is shown in the simplified schematic diagram of the boiler plant shown below.



Currently, steam is generated at approximately 85 PSIG and distributed in mains that deliver heat to various processes over a distance of more than +/-1200 Ft. Condensate is returned by two systems. Steam is delivered to various locations in the process by vertical lateral pipes extending down from the mains. Steam is also converted to hot water which is pumped throughout the facility in supply and return lines. A “High Pressure Return” system from traps on the steam mains delivers condensate by gravity back to the Boiler Feed Tank (BFU-1). Steam traps on the lateral lines and at the process tanks also deliver condensate by a pumped return system to the Boiler Feed Tank.

Steam-powered condensate pumps were recently replaced, which has resulted in a benefit of $8,000/yr due to increased condensate return.

It appears as though the high pressure condensate with flash steam is used to heat the Boiler Feed tank so it acts as a deaerator. In addition, steam can be injected by a control valve to maintain turbulence and a desired tank temperature.

Focus of Assessment:

The focus of the Assessment was on strategies to reduce natural gas use by steam system efficiency improvements. In addition to being used to generate steam, natural gas is used for two annealing process lines.

Approach for ESA:

The approach included the following:

1. Compiling energy consumption information
2. Meetings/interviews with steam system operations and management personnel
3. Surveys of existing facilities

4. Identification and analysis of energy conservation opportunities

General Observations of Potential Opportunities:

Energy consumption at the plant is estimated in SSAT runs as follows:

- Imported electricity: 98,549,000 kWh (336,348 mmBTUs)
- Natural Gas for steam: 62,200 mmBTUs
- Natural gas for process heat and other uses: 101,460 mmBTUs

Electricity is provided to the plant by the Tennessee Valley Authority (TVA). A price increase of approximately 10% was recently announced. However, the overall cost of electricity is still relatively favorable. A "benchmark" price of $0.048/kWh was used to estimate the total cost of electricity to the facility. The plant has experienced the impact of natural gas cost increases and fluctuations that occurred in 2005.

Note that the baseline model for **gas consumption to produce steam** is $620,000/yr. assuming a gas cost of $10/million BTUs. Preliminary savings estimates listed below are in relation to these baseline costs. Energy Conservation opportunities identified include the following.

Near Term

- Instrumentation, Controls and Training – Flow, temperature and pressure meters should be installed as well as status alarms for the boilers. When this equipment is coupled with an expanded logging process for plant data and system operation training for the staff, it is expected to save a minimum of 2% of the gas consumed for steam generation or $15k annually.
- Boiler Heat Recovery – Boiler economizers capture otherwise exhausted heat and reintroduce it into the system, typically by heating cold make-up water for increased system efficiency. Based on estimates of current efficiency, savings of $22k appear possible. If considered with boiler burner control replacement, the savings increase to $37k.
- Burner Controls – Modern boiler control systems improve efficiency by providing more efficient combustion and better management of steam output. New burner controls are expected to result in savings of $15,000 per year.
- Steam Trap Maintenance and Steam Leaks – Although additional investigation is required, it is estimated that implementing improvements in terms of consistency with current practices (location and types of traps) and elimination of leaks is estimated to save $64k annually. Most of this savings is associated with steam trap repairs.
- Insulation-piping/devices – Repairing/replacing failing or absent insulation over pipes, valves and other devices is estimated to save $7k per year.

Mid- and Long Term

- Heat recovery from Annealing Furnaces – Potential future opportunities include using the exhaust gas for heating process baths or using the recovered heat as a source for an absorption chiller which would replace the roof-top direct expansion units that cool the wire spooling operations. Opportunities associated with the process heat furnaces would be candidates for consideration under a Process Heat Assessment.

Management Support and Comments:

The systems and operating practices in place at the Dyersburg Plant are very similar to those in a plant at Rogers, Arkansas and other Bekaert facilities in the mid-west. The results of the ESA will be distributed to the Facility Managers at these other locations.

DOE Contact at Plant/Company: Same as corporate Lead.